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Low Capacitance FET for Operation at Subthreshold Voltages

Abstract

A field effect transistor (FET) has underlap regions adjacent to the channel doping region. The underlap regions have very low dopant concentrations of less than $1x10^{17}$/cc or $5x10^{16}$/cc and so tend to have a high resistance. The underlap regions reduce overlap capacitance and thereby increase switching speed. High resistance of the underlap regions is not problematic at subthreshold voltages because the channel doping region also has a high resistance at subthreshold voltages. Consequently, the present FET has low capacitance and high speed and is particularly well suited for operation in the subthreshold regime.